THE BURDEN OF

Unintentional Falls In N.C.

North Carolina Public Health

North Carolina Injury & Violence PREVENTION Branch

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2009

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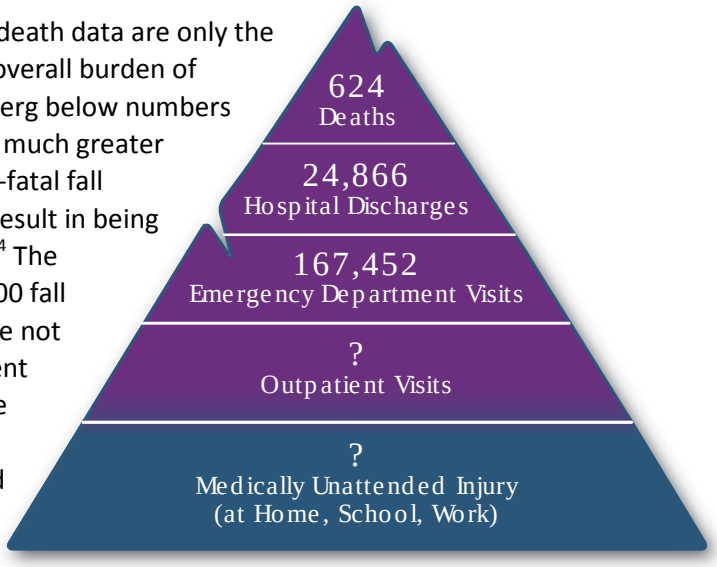
Overview of Unintentional Fall Injuries

The burden of unintentional fall injuries in North Carolina is an under-recognized and serious public health problem that is costly to our wallets, but more importantly, to our quality of life. Unintentional fall injuries and deaths are increasing. Falls are the number one reason for injury-related trips to the emergency department (ED).[1] Not only are fall injuries causing many visits to the ED, but 624 North Carolina residents lost their lives because of a fall in 2007 — that is almost two people every day.[2] Falls can result in serious injuries. For example, it is estimated that 28 percent of traumatic brain injuries occur because of a fall.[3]

This document outlines the burden of resident unintentional fall injuries in North Carolina. As a mechanism of injury category, unintentional falls encompass many different types of events, including falls on stairs or steps; from ladders; out of buildings; into holes; from one level to another such as from playground equipment, cliffs or furniture; and falls on level ground as a result of slipping, tripping, or stumbling.

Also included are sports injuries involving falls due to slipping, tripping or pushing, and collisions due to pushing or shoving by another person. This category does not include falls from bicycles or from riding animals (these data are captured in other injury categories), but does include falls while using recreational equipment such as scooters, in-line skates or skateboards. This category also does not include intentional fall injuries, which are the result of assault or other purposeful action against oneself or others.

Figure 1: The Injury Iceberg shows that death data are only the beginning when it comes to understanding the overall burden of unintentional fall injuries. The levels of the iceberg below numbers of deaths are larger because they represent the much greater numbers of individuals who are affected by non-fatal fall injuries. Just below deaths are fall injuries that result in being admitted to the hospital, nearly 25,000 in 2006.[4] The number jumps dramatically to more than 167,000 fall injuries resulting in an ED visit.[1] Because data are not available on how many falls are seen in outpatient settings or are not medically attended, there are question marks in place of real numbers on the bottom two levels of the iceberg. Estimates and national studies indicate that numbers in these categories are much greater than even the notably large numbers of ED visits.[5]



Deaths from Falls: Falls are the third leading cause of unintentional injury death for North Carolina residents for all age groups combined, and in every year from 1999 to 2006, falls led to the death of more individuals ages 65 and older than any other type of injury. The death rate from falls of N.C. residents increased 27 percent from 2000 (5.4 deaths per 100,000 population) to 2007 (6.9) for all ages. In 2007, there were a total of 624 deaths from falls in North Carolina.[2]

Non-fatal Falls: The huge burden of fall injuries is seen not only in the number of deaths, but also in the injuries that are serious enough to result in hospitalization or to warrant a trip to the ED. In 2006, there were close to 25,000 discharges of patients hospitalized due to falls, or nearly 40 per every fall injury death. For ED visits, there were approximately 270 per every fall injury death. This translates to more than 167,000 visits to an ED in North Carolina in 2007. That means there were about 19 ED visits per hour, or nearly one every three minutes.

Gender and Race: The 2002-2006 North Carolina age-adjusted death rates for resident unintentional falls were higher for men (8.4) than for women (5.4). Fall deaths also differed by race, with age-adjusted death rates for whites (7.2) being higher than for minorities in the state (4.1).[6]

Economic Burden: Cost estimates from 2005 show that hospital-admitted unintentional falls cost North Carolinians more than $5.8 billion in (direct and work loss) costs. Of that, $3.8 billion is attributed to falls in the 65 and older age group.[7]

Figure 2: Unintentional Fall Rates for 2007 ED Visits, 2006 Hospital Discharges and 2007 Deaths, N.C. Residents, by Age

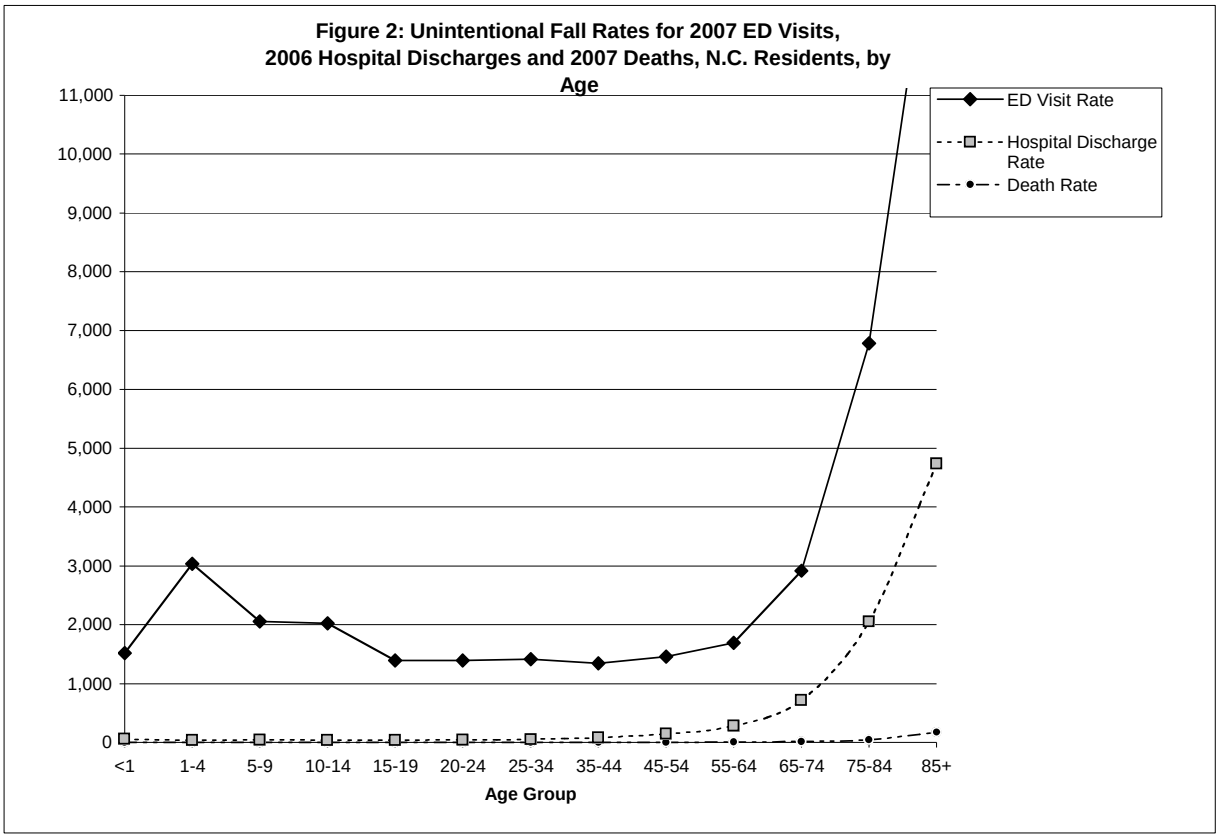


Figure 2 shows that 2007 ED[1], 2006 hospital discharge[4] and 2007 death rates[2] all see a steep curve upward on the right of the graph, where older age groups are represented. Though the line representing death rates appears low and to have little upturn at the right, this is only because of scale and the relatively fewer numbers of deaths from falls when compared to the high numbers of

hospitalizations and ED visits. Figure 3 examines death rates alone and shows the familiar sharp upturn on the right of the graph.

A spike in the ED rate occurs in young children ages one to five. This indicates that children sustain many injuries from falls that result in a trip to the ED, but that the injuries do not require hospitalization or result in a significant number of deaths.

Figure 3: Unintentional Fall Death Rates, N.C. Residents, by Age 2007

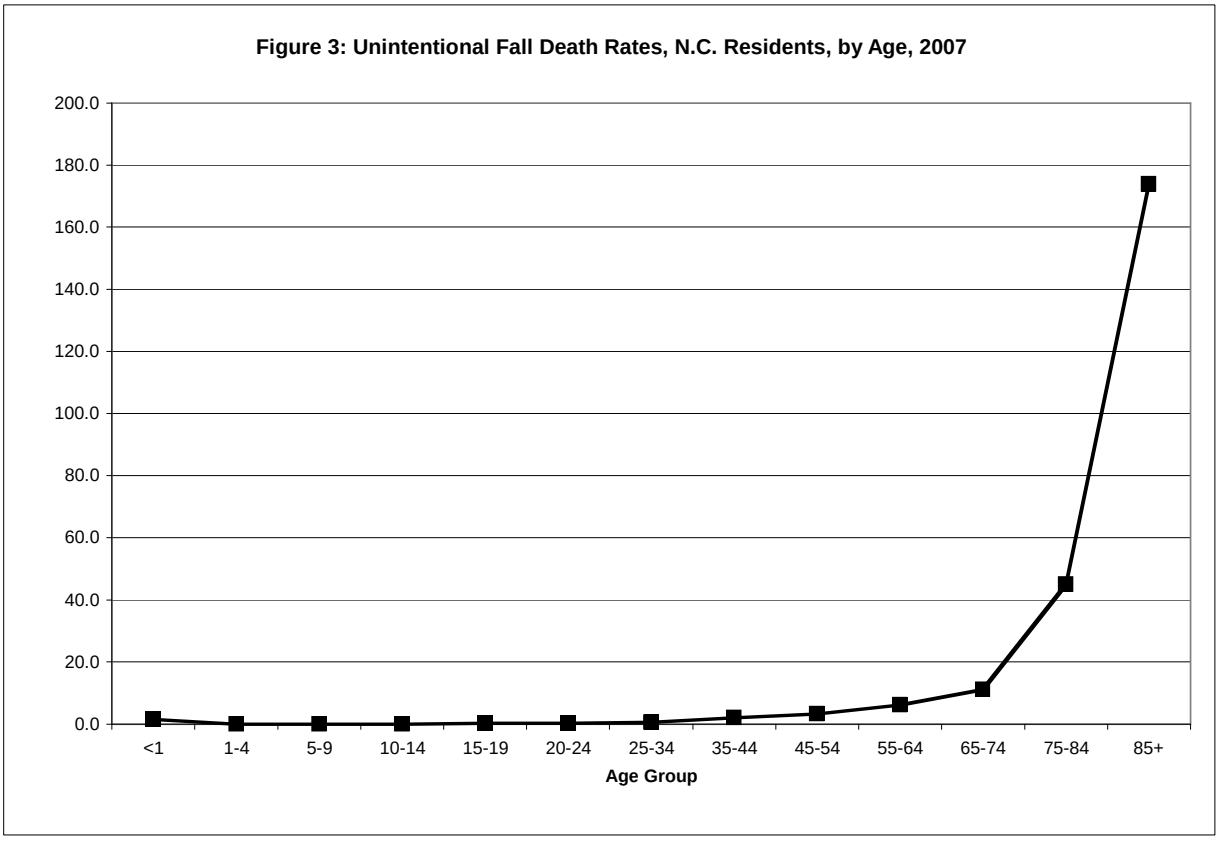


Figure 3 offers a closer look at the death rate[2] to show that, like the ED and hospital discharge rates, the curve sharply turns upward on the right, in the older age groups. As individuals advance in age, so does the death rate from falls. The rate increases 286.5 percent from the 75- to 84-year-old age group (45.00) to the group that is 85 and older (173.91). This oldest age group suffers the most frequently from the worst outcome of fall injuries — death.

Table 1: Count of Unintentional Fall Death Rates, N.C. Residents, By Age, 2007

Table 1 shows the actual numbers and rates[2] represented in Figure 3. Where the count of falls is below 20, there is a * to indicate that the number is too small to accurately calculate a rate. Note the steady increase in rate as individuals age, and the huge jumps seen in the oldest age groups.

Table 1: Unintentional Fall Death Rates, N.C. Residents, By Age, 2007

Age Group	Count	Population	Rate/per 100,000 population
<1	*	131,293	*
1-4	*	506,371	*
5-9	*	611,420	*
10-14	*	593,613	*
15-19	*	620,039	*
20-24	*	610,055	*
25-34	*	1,219,433	*
35-44	27	1,341,268	2.0
45-54	42	1,300,650	3.2
55-64	63	1,023,477	6.2
65-74	66	591,918	11.2
75-84	166	368,889	45.0
85+	248	142,606	173.9

Figure 4: Unintentional Fall Hospital Discharge Rates, N.C. Residents, by Age, 2006

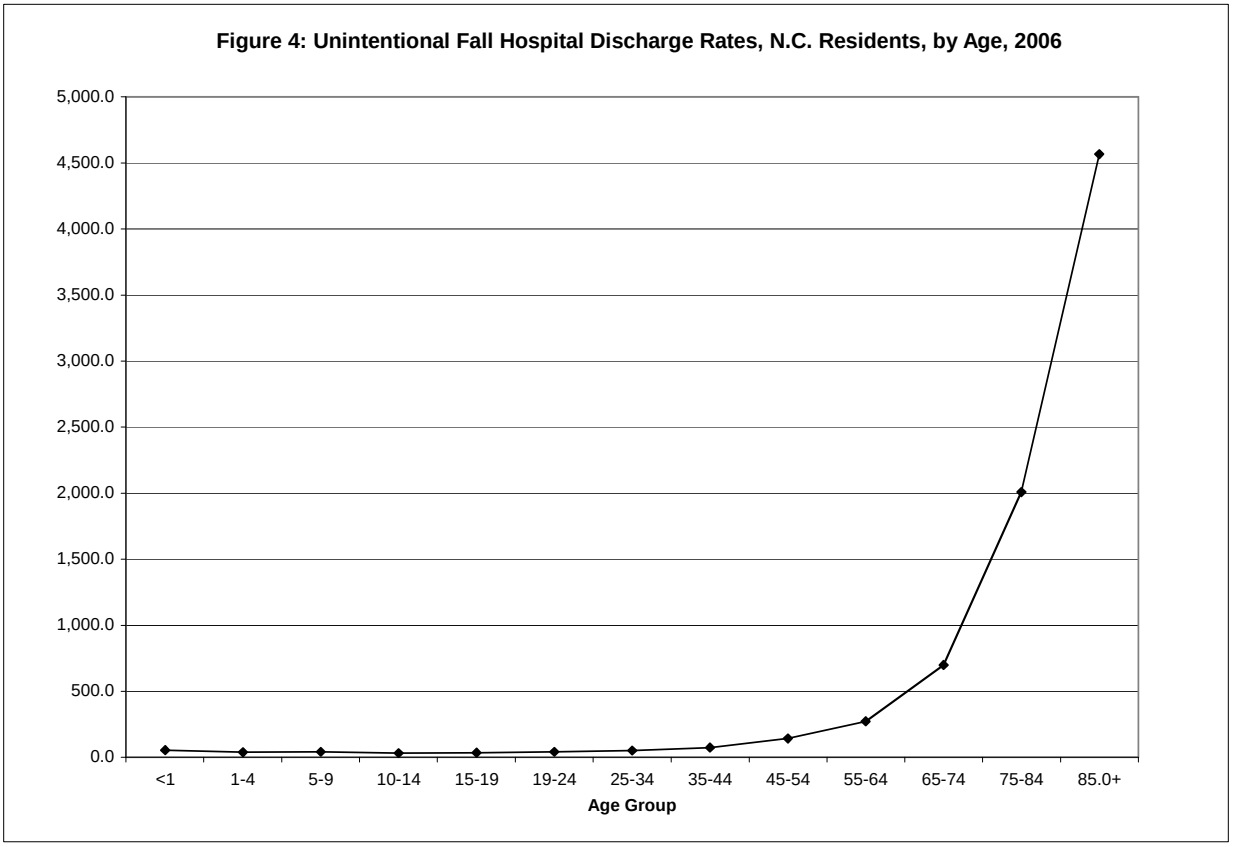


Figure 4 shows the familiar sharp upwards curve in older age groups, but highlights the much higher rates seen when looking at hospital discharge rates[4] versus death rates. Note the hospital discharge rates reach to nearly 5,000 in this graph, while in Figure 3 the death rates only reach 200.

This large difference in rates demonstrates a typical pattern in injury data: fatalities are only the tip of the iceberg — morbidity related to injury is a significant problem that should be addressed. It is important to recognize the large numbers of individuals who are hospitalized for a fall injury. When fall injuries are severe enough to warrant hospitalization, people are often left with serious, long-term consequences that greatly reduce their quality of life.

Table 2: Count of Unintentional Fall Hospital Discharge Rates, N.C. Residents, By Age, 2006

Table 2 shows the actual numbers and rates of hospital discharges[4] represented in Figure 4. All age groups show greater rates in hospital discharges for fall injuries than for deaths that were represented in Table 1. Again, note the steady increase in rate as individuals age, starting with the 15- to 19-year-old age group. The rate in the 85 and older age group is more than double the rate of 75 to 84, and six times that of the 65- to 74-year-old age group.

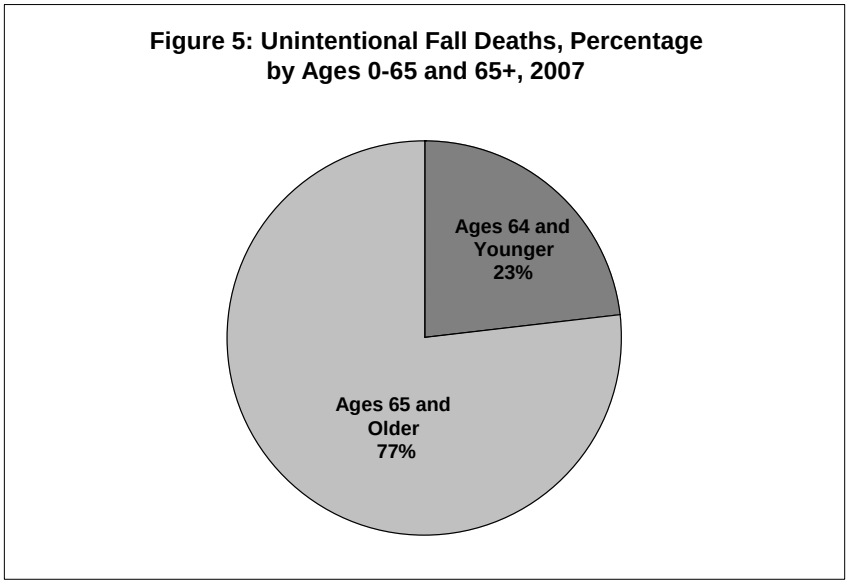
Table 2: Unintentional Fall Hospital Discharge Rates, N.C. Residents, By Age, 2006

Age Group	Count	Population	Rate/per 100,000 population
<1	71	131,293	55.3
1-4	191	506,371	39.0
5-9	242	611,420	41.1
10-14	195	593,613	33.1
15-19	208	620,039	34.3
20-24	262	610,055	43.0
25-34	615	1,219,433	50.7
35-44	1,004	1,341,268	75.8
45-54	1,831	1,300,650	144.6
55-64	2,668	1,023,477	273.4
65-74	4,026	591,918	701.0
75-84	7,358	368,889	2,007.7
85+	6,195	142,606	4,566.4

Older Adults' Fall Injuries

Fall death and hospital discharge rates are increasing for the general population, and much of this is due to rate increases seen in the 65 and older population. Unintentional falls in the 65 and older population are of great concern because they occur more frequently and have more severe consequences. North Carolinians in the oldest age groups often suffer the most from falls. National data show that people 75 years of age and older have the highest rates of traumatic brain injury-related hospitalizations and death.[8] Falls are the leading cause of fatal injuries (2000-2007)[2] and the 2nd leading cause of nonfatal injury hospitalizations[4] (2004-2005) for people 65 and older in North Carolina. The death rate due to falls for people 65 and older was 23 times the rate for those 64 and younger (2007).[2]

Figure 5: Unintentional Fall Deaths, Percentage by Ages 0-65 and 65+, 2007



As Figure 5 shows, more than three-quarters of unintentional fall injury deaths occur in the 65 and older age group. [2] For this reason, many efforts at fall injury prevention are directed towards this age group.

Not only is the fall injury problem in older adults currently of major concern, but projections show a "Silver Tsunami" coming to North Carolina over the next decades.

In 2000, fewer than 25 of North Carolina's 100 counties had more people over the age of 65 than under the age of 18. Population projections based on July 2006 data show that, in 2030, over 75 counties will have more people 65 and older than 18 and younger.[9]

Table 3: 2030 Projections for Deaths, Hospitalizations and ED Visits Due to Unintentional Fall Injuries, N.C. Residents, Ages 65+

Table 3: 2030 Projections for Deaths, Hospitalizations and ED Visits Due to Unintentional Fall Injuries, N.C. Residents,		
	2006/2007*	Year 2030
Deaths	480	947
Hospitalizations	17,579	35,569
ED Visits	44,541	87,921

Table 3 [1,2,4] shows the effect this explosion in the older adult population will have on deaths, hospitalizations and ED visits due to unintentional fall injuries. The 2030 count projections are based

on fixed 2007 rates for fall injuries. It is expected that this rate will increase as it has done for the past several years. Though these numbers, like the 97 percent increase in projected ED visits, are alarming enough, current trends tell us that these are likely conservative estimates. The true numbers will likely be even larger.

Figure 6: Unintentional Fall Death Rates, N.C. Residents, Ages 65+ 2000-2007

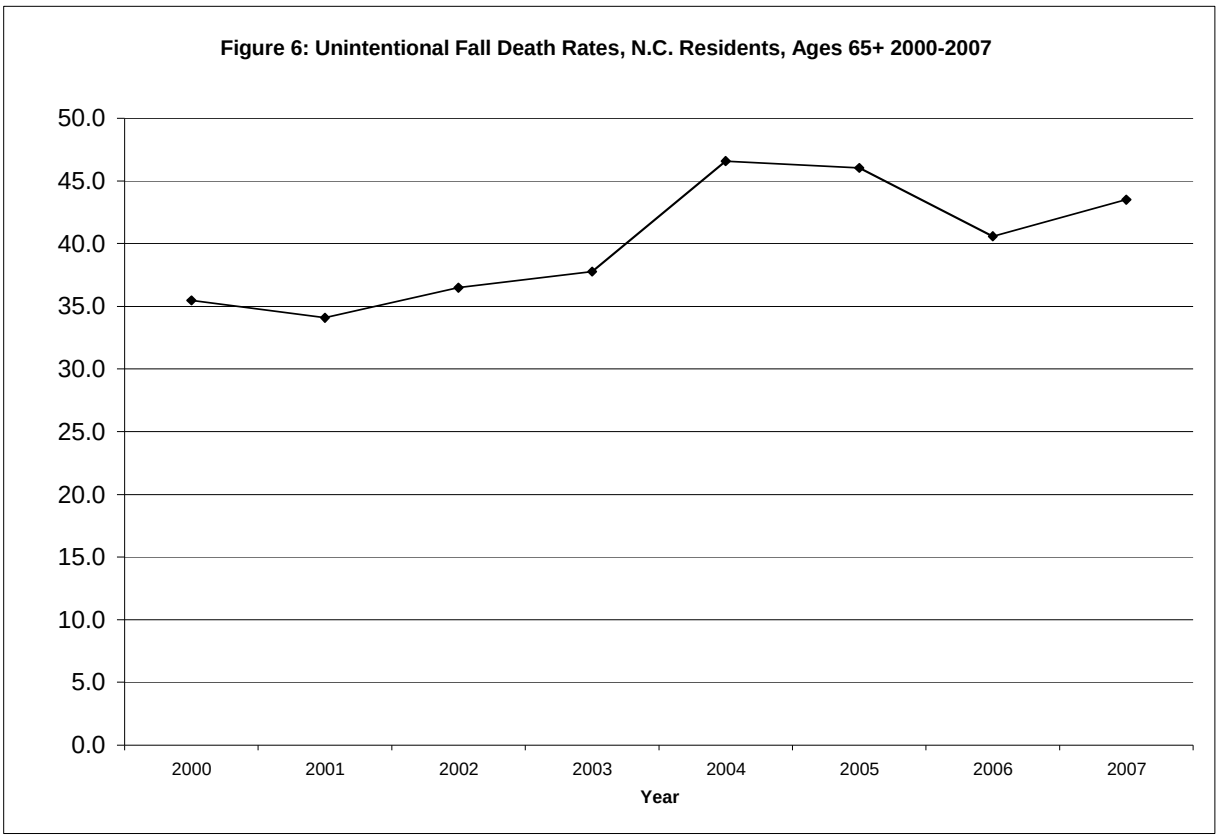


Figure 6 gives a closer look at death rates, focusing only on the rates for the 65 and older population.[2] Not only do unintentional fall injury death rates increase with age, but from 2000 to 2007 there is a general upward trend in death rates seen over time within the 65 and older age group. The rate went from 35.5 in 2000 to 43.5 in 2007, about a 22 percent increase.

Youth Fall Injuries

Figure 7: Unintentional Fall ED Visit Rates, N.C. Residents, Age <19, 2007

Figure 7 takes a closer look at the increase in the rate of ED visits due to falls in residents ages 19 and younger.[1] Fall ED visit rates are much higher than death or hospital discharge rates for this group, as demonstrated by the spike in Figure 1. An injury that requires a visit to the ED is costly, and though severity of injury is not captured in the data, it is possible some of these falls caused major injuries.

Figure 7: Unintentional Fall ED Visit Rates, N.C. Residents, Age <19, 2007

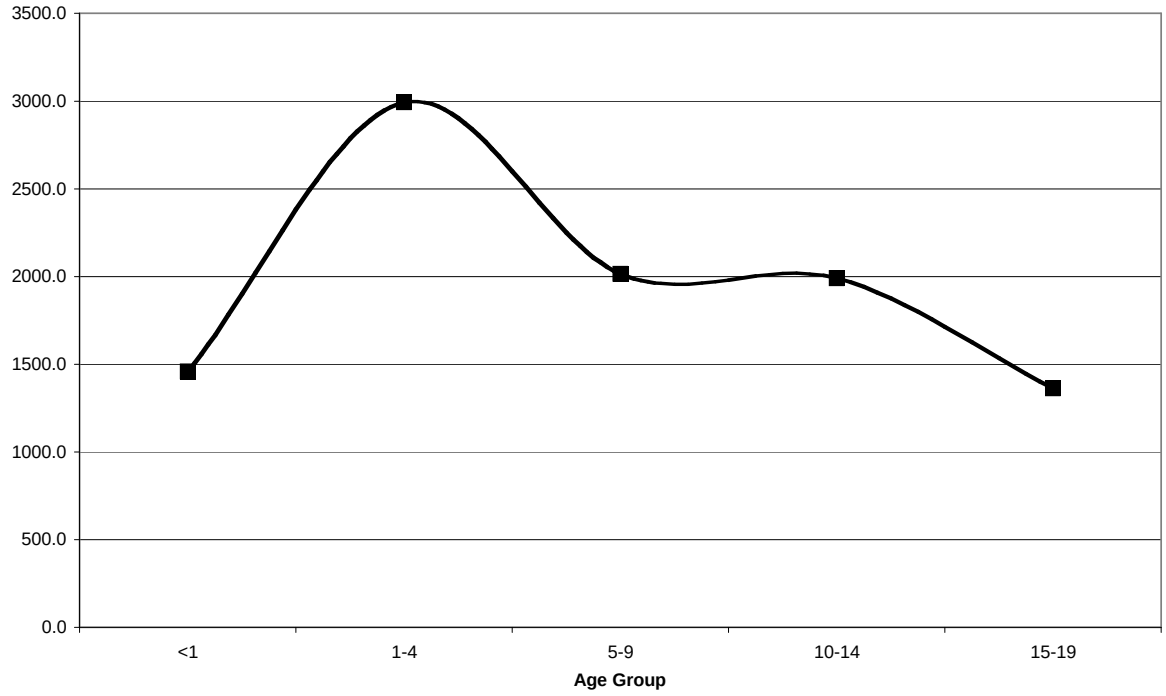


Table 4: Count of Unintentional Fall ED Visit Rates, N.C Residents, Age <19, 2007

Table 4 shows that there were close to 50,000 visits to the ED due to a fall injury in the 19 and younger age group in 2007. The 1-to 4-year-old age group has the highest rate within the 19 and under population. [1]

Table 4: Unintentional Fall ED Visit Rates, N.C. Residents, Age <19, 2007

Age Group	Count	Population	Rate/per 100,000 population
<1	1,914	131,293	1457.8
1-4	15,150	506,371	2991.9
5-9	12,319	611,420	2014.8
10-14	11,814	593,613	1990.2
15-19	8,450	620,039	1362.8

Table 5: Count of Unintentional Fall Hospital Discharge Rates, N.C Residents, Age <19, 2006

Table 5: Unintentional Fall Hospital Discharge Rates, N.C. Residents, Age <19, 2006

Age Group	Count	Population	Rate/per 100,000 population
<1	71	128,302	55.3
1-4	191	489,602	39.0
5-9	242	589,211	41.1
10-14	195	589,651	33.1
15-19	208	606,566	34.3

Table 5 shows that the youngest children (age one and younger) were most likely to be hospitalized due to a fall. The rate for children one and younger (55.3) is about 25 percent higher than in 5- to 9-year-olds (41.1), which is the group with the next highest rate in the 19 and younger population.[4]

A report compiled by the Harborview Injury Prevention and Research Center at the University of Washington outlines what types of falls occur among youth ages 0-17. National hospital discharge data reveal that the most common type of fall leading to hospitalization in youth ages 0-17 is a fall from one level to another, such as from playground equipment, beds, tables and chairs. In 2005, there were 407 hospital discharges for falls from one level to another among youth ages 0-17, which comprised 44 percent of fall-related hospital discharges in this age group. Though youth fall deaths are very rare, those that do result in severe or fatal injuries are usually due to falls from second story or higher windows. The mean height for a fatal injury is 5-6 stories. Window screens are made to pop out for fire safety reasons, and do not serve as a barrier to prevent children from falling out of windows.[10]

Trends over Time

For the field of injury and violence prevention, unintentional fall injuries have clearly come into view as a top priority for prevention initiatives. Fall deaths, hospitalizations and visits to the emergency department are all on the rise.

Figure 8: Unintentional Fall Death Rates, N.C. Residents, All Ages, 2000-2007

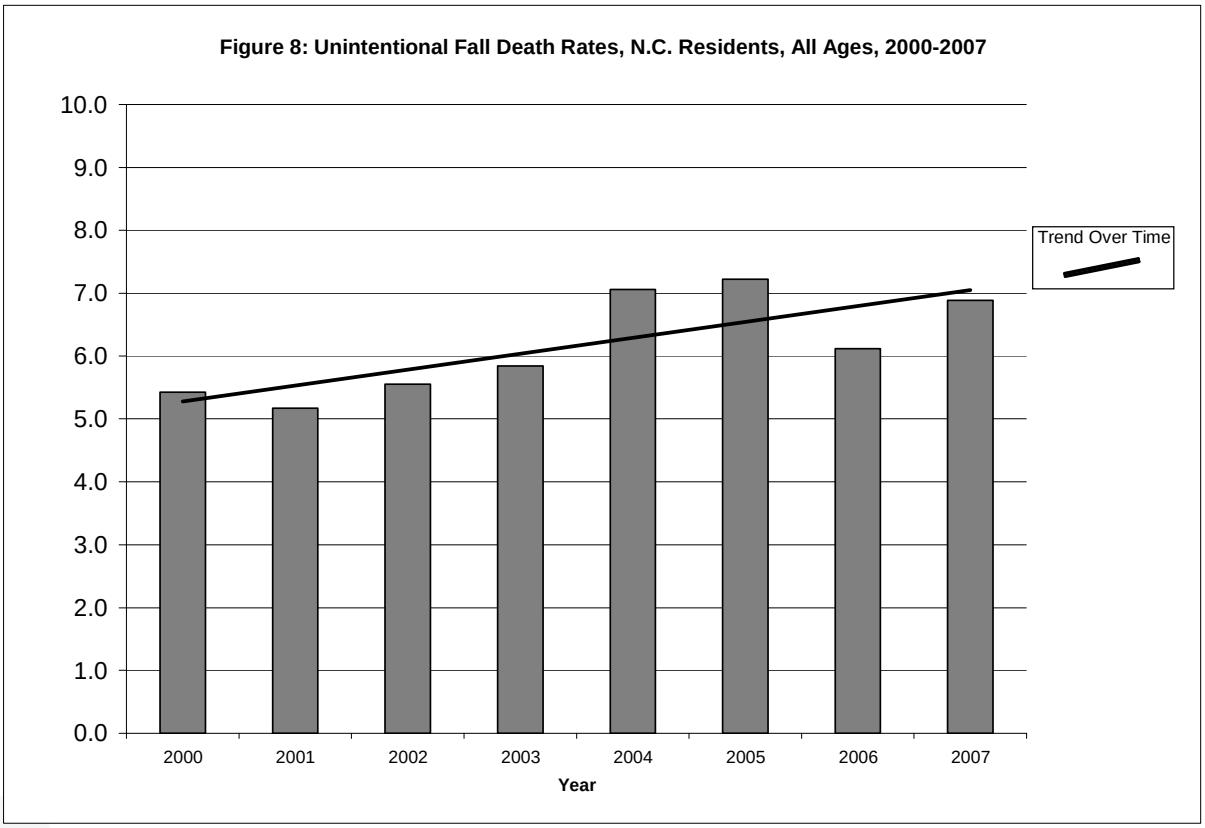
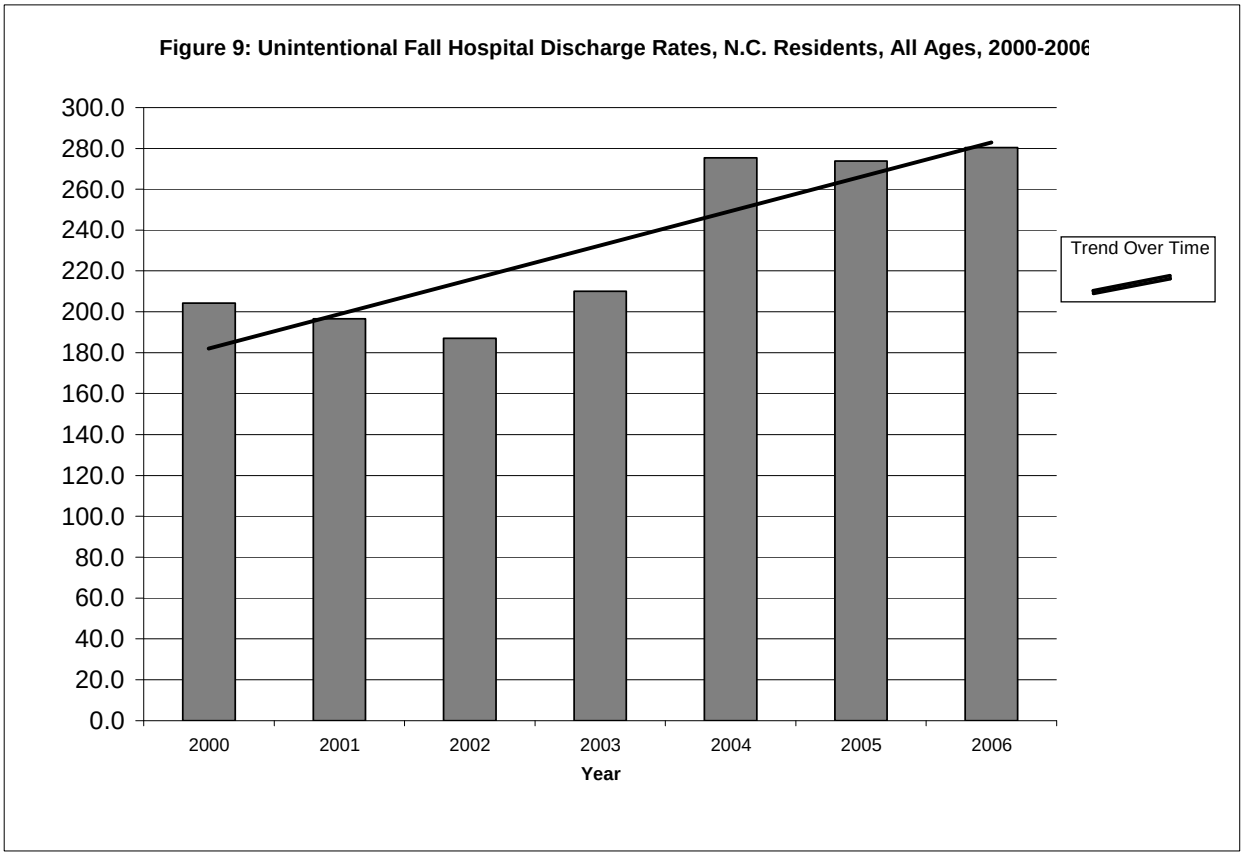


Figure 9: Unintentional Fall Hospital Discharge Rates, N.C. Residents, All Ages, 2000-2006

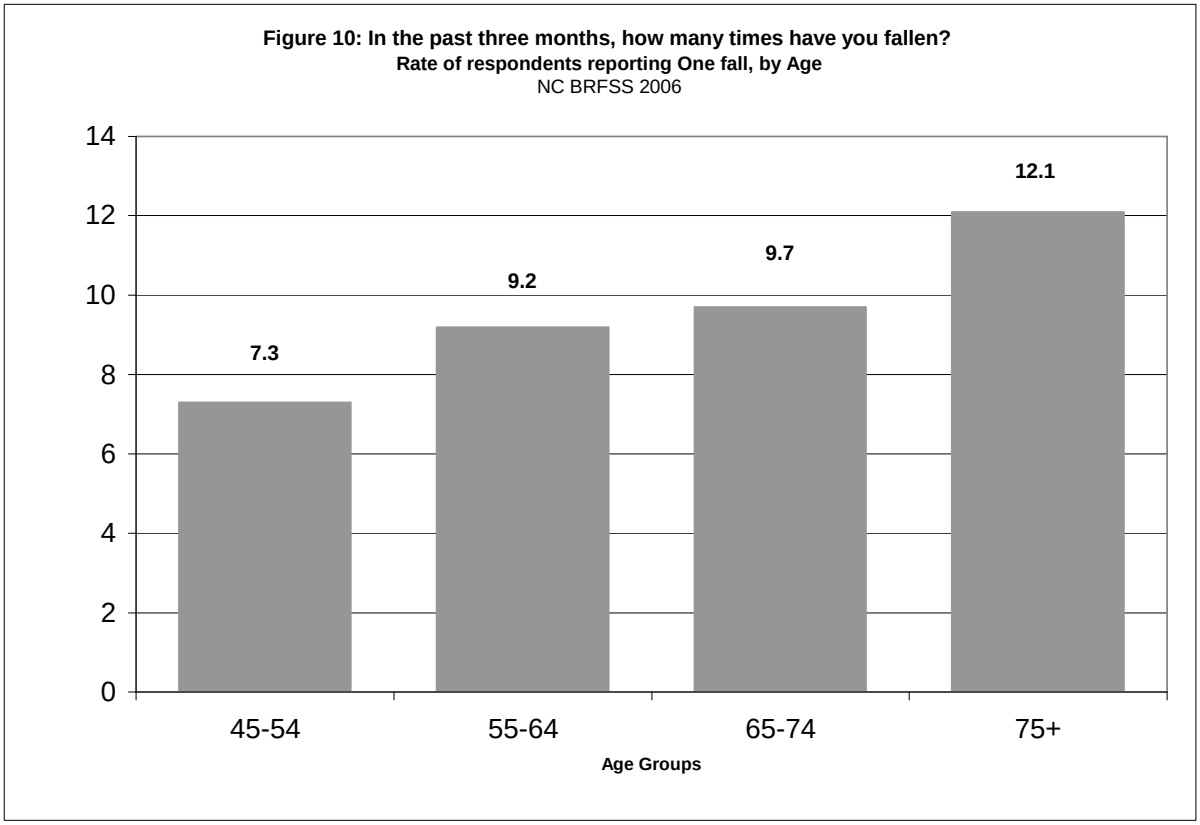


Figures 8 and 9 both show an upward trend over time in death and hospital discharge rates. Death rates represented in figure 8 are lower than hospital discharge rates seen in figure 9, pointing out that non-fatal fall injuries are of significant concern and a major burden on the healthcare system.[2,4] No trend is provided for ED visit data because there are only two years of data available. Still, from 2006 to 2007 there was an over 20 percent increase: in 2006, the rate was 1,496.3 and in 2007 it jumped to 1,848.0.[1]

N.C. BRFSS Data

The N.C. Behavioral Risk Factor Surveillance System (N.C.-BRFSS) is a random telephone survey of state residents aged 18 and older in households with telephones. The following information is based on N.C.-BRFSS data.[11] Other data presented in this document was generated from death certificate, hospital discharge or ED visit data. BRFSS data differs in that it is self-reported and can include many different types of falls. A self-report of a fall could mean there was no injury from the fall, the fall resulted in only a minor injury and no medical attention was needed, or the fall was severe and caused hospitalization. Severity of fall is not captured in this data.

Figure 10: Rate of respondents reporting one fall in the past three months, by age group, N.C. BRFSS, 2006



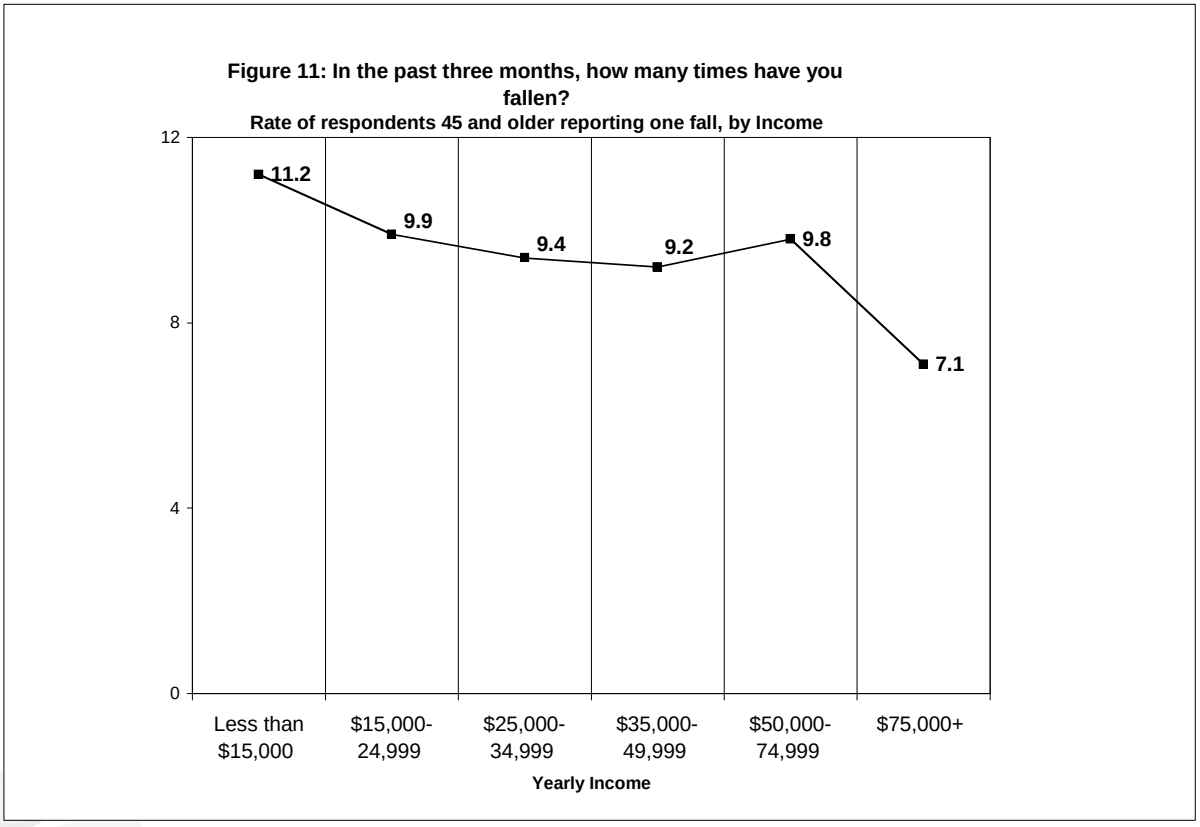
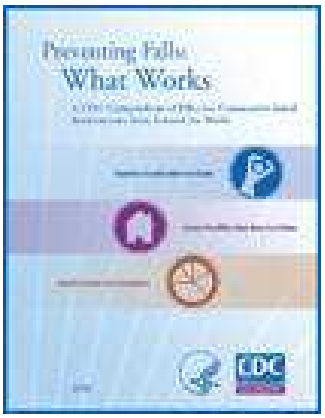


Figure 11: Rate of respondents 45 and older reporting one fall in the past three months, by income, N.C. BRFSS, 2006

Figure 11 also presents self-reported falls, but stratifies the information by income. There is a general slope downwards as incomes increase, and a sharp decrease seen in the highest income group.

Preventing Falls



The guide, Preventing Falls: What Works A CDC Compendium of Effective Community-based Interventions from Around the World, is a compendium of interventions designed for public health practitioners and community-based organizations, to help them address the problem of falls among older adults. This document from the Centers for Disease Control and Prevention describes 14 scientifically tested and proven interventions, and provides relevant details about these interventions for organizations who want to implement fall prevention programs. www.cdc.gov/ncipc/preventingfalls.

Further Information on the Web

The Centers for Disease Control (CDC): Preventing Falls in Older Adults – The CDC's Injury Prevention Research Center web resource including fact sheets, downloadable posters and brochures and data on falls in older adults (www.cdc.gov/ncipc/duip/preventadultfalls.htm).

Preventing Falls Among Older Adults in the United States: Literature Update 2005 from the University of North Carolina at Chapel Hill's Injury Prevention Research Center gives an update on research regarding risk factors and prevention activities for older adult falls. www.iprc.unc.edu/pages/cdc_bulletins/Falls_Feb08.pdf

American Association of Retired Persons (AARP) - The nation's leading organization for people 50 and older. AARP provides information and education, advocacy, and community services through a national network of local chapters and experienced volunteers. www.aarp.org

National Institute on Aging (NIA) - One of the National Institutes of Health and the principal biomedical research agency of the United States Government. The NIA promotes healthy aging by conducting and supporting biomedical, social, and behavioral research and public education. www.nih.gov/nia

U.S. Administration on Aging (AoA) - The agency which works to heighten awareness among other Federal agencies, organizations, groups, and the public about the contributions that older Americans make to the nation and to educate them about the needs of older people. The AoA also seeks to educate older people and their caregivers about the benefits and services available to help them. www.aoa.dhhs.gov

Notes

Rates: All rates presented in this document are per 100,000 population.

Death Data: The death certificate dataset, obtained from the N.C. State Center for Health Statistics, contains information on every death that either occurred in N.C. or to a resident of N.C. For this document, only deaths of residents of N.C. were considered, regardless of the state in which the death occurred. Diagnoses and cause of injury were determined based on International Classification of Diseases, 10th Revision, Clinical Modification (ICD-10-CM) codes.

Hospital Discharge Data: A hospital discharge occurs when a person who was admitted to a hospital leaves that hospital. A person who has been hospitalized more than once in a given calendar year will be counted multiple times as a discharge and included more than once in the hospital inpatient discharge data set; thus, the numbers in this report are for discharges, not persons. All discharges are for residents of N.C., from N.C. hospitals. Discharges of out-of-state residents are not included in this report.

ED Data: The ED and the inpatient hospitalization data are not mutually exclusive. A patient could be counted as visiting the ED if she later is admitted and then discharged from the hospital.

Diagnostic groupings and code numbers are based on the International Classification of Diseases, 9th Revision, Clinical Modification (ICD-9-CM). The external cause of injury codes E880-E886 and E888 (accidental fall) in the first E-code field were used to identify the emergency room visits and discharges of inpatients with fall injuries.

References

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[11] North Carolina Behavioral Risk Factor Surveillance System (N.C. BRFSS), 2006 Questions related to falls, State Center for Health Statistics. Available at: www.schs.state.nc.us/SCHS/brfss/results.html. Accessed on 10/2008.